# DESIGN AND OPERATION MANUAL
# PART II

## I. PURPOSE

The purpose of this portion of the manual is to present engineering data and operational experience in a narrative form so that regulatory agencies reviewing the design and employees of the Kent County Department of Public Works can clearly understand the engineering and operational factors that must be adhered to in order to operate the site as designed. It is intended that this document be read by all supervisory personnel and equipment operators employed by the Department so they can fully understand the importance of their assignment.

## II. DESIGN PARAMETERS

In addition to compliance with existing State solid waste laws, the site has been designed using the following parameters:

1. Estimated tons per day: 200 to 400
2. Estimated daily traffic: 200 maximum
3. Type of waste: Solid only
4. Method of operation: Cells

## III. FORMULATION OF DESIGN

The Department of Public Works has gained considerable experience in operating its Kentwood and Sparta facilities. This experience has clearly brought out the definite benefits of operating a landfill using the cell method. A typical cell is 300 meters long, 28 meters

2. Cover material would have to be hauled larger distances, thus requiring an earth mover. Equipment redundancy is extremely expensive because if the earth mover broke down, the landfill compactor is useless for moving cover long distances. The earth mover could not push refuse if the compactor broke down. The earth mover could not operate in inclement weather.

3. Control of blowing papers is harder in an area fill vs. a cell method.

4. Township residents did not want a ski hill built.

5. Leachate control and collection systems are not as reliable because of the large surface area involved.

6. Excavation of cells can be done by one (1) crane in all kinds of weather at one-half the cost of moving by earth mover. In cell operation the cover material is within 50 feet and all the refuse machines can move and place cover. Since the operational surface area in an area fill is larger, more cover material is required.

Soil borings indicated that in certain areas of the site there exists some ground water. Because of our strong desire to use cells and to maximize the amount of refuse placed per unit surface area, we found it necessary to do some dewatering on the site. Tests have revealed dewatering can be done quite easily, and because the proposed operating area is situated on top a hill, no surface water will run onto the site. Further, once the site has been dewatered, the water should not rise because the recharge area has been sealed.

Based on the above information, a review of available literature and a critique of present operations, the following design features were chosen.

1. Cells would be used in the operation. The long axis of the cell would be oriented west - east, as this orientation is in the direction of the prevailing wind and at right angles to the general surface water flow. The right angle layout is desirable because the spoil banks impede surface water from entering the cell and only rain water falling directly on the cell requires handling during operation. Cell dimensions are clearly spelled out in the plans.

2. The cell bottoms will be sealed to prevent water percolating through them during filling. In addition, all cells are sloped (1% minimum) to the east and a water collection sump and access manhole is located at the east end of the cell. (Note: The horizontal movement of water on the cell bottom will be quite simple because the permeability of compacted refuse should be near $1.5 \times 10^{-2}$ cm./second which is considerably greater than most sands and gravels.) The gravel sump also serves as a gas vent.

3. Permanent dewatering wells are located around the site. The purpose of these wells is to lower the water level to allow a minimum of 2.4 meter isolation from the cell bottom. These pumps will be available to lower the water level as needed. Automatic alarm circuits will be installed during operation for this control. These twenty centimeter wells will also be used as sampling outlets.

4. After cells one thru thirty (west-east) are completed, north-south cells thirty-one and thirty-two will be constructed. These cells will have gravity underdrain and a twenty centimeter sanitary sewer on the bottom. This collection sewer will tie into all the collection sumps on the east end of the thirty cells. The collecting sewer in cells thirty-one and thirty-two will flow by gravity north to an evaporation/stabilization lagoon. The size

of the lagoon will not be determined until start of construction of Cell No. 27. It is anticipated that the lagoon will be very small because flow in the collecting sewer will be near zero.

5. The final cover will be sixty (60) centimeters of clay.

6. During normal operations, one-way traffic will be maintained on the site. The on-site roads are paved with a bituminous surface. A tire cleaner will be installed near the exit from the site.

7. A 1.8 meter (6') chain link fence will be constructed around the site.

8. Where natural ponding is not available for surface drainage, siltation basins will be constructed.

9. A scale, scalehouse, and maintenance building, complete with septic system and water, will be constructed. The initial well constructed for the buildings will also serve for dewatering purposes.

10. A landscape architect will design the entrance way.

11. The site will be used for a park upon completion. The Department of Public Works and Township have agreed to set aside funds during the operation for end-use development.

## IV. OPERATING PLAN

### A. Dewatering

Four permanent dewatering and monitoring wells are to be installed near test borings 33A, 35, 39. A dual purpose well will be installed near TB 47. These facilities are permanent and will be left in place. Temporary dewatering wells will be situated at strategic points around

the site to speed up the dewatering process if necessary. The permanent wells will run continually as long as water is present and it is anticipated that some time in the future a new well located near hole thirty-nine will be placed at a deeper elevation to allow further drawdown of the water in this area. When the Department leaves the site, these wells will remain in the ground for periodic monitoring by Department sewer maintenance personnel and also for lawn irrigation by the Parks Department. Stab wells will be installed in cell areas prior to digging to measure water levels.

B. Cell Operation

The operation plans spell out the sequence for constructing and filling the cells. Cells will be filled in the direction of the prevailing wind (west to east) and at the time of filling, a pump will be placed in the manhole sump and will remain in place until the cell is completely filled. Any waters that fall into the cell during filling will be pumped to the temporary holding lagoon located in the future cell twenty-seven. Once filling a cell has commenced, the filling operation will not be diverted to another cell until the cell is completely filled. (This procedure is different from Kentwood.)

The cell excavation and sump construction will be performed initially by private contractors who will have the option of providing either PVC or clay seal in areas where required. The construction of

cell number one (all clay) will be worded such that all the material excavated from the cell will be removed from the immediate area and stockpiled for use as final cover. Cover material for cell number one will come from material deposited during construction of cell number three. The Kent County Department of Public Works will purchase a sixteen yard scraper to attach to our TD 25 dozer and prior to excavation of a cell, we will strip the top three or four feet of clay and stockpile it for use as final cover material. The landfill foreman will be responsible for checking access manholes, located at the east end of all completed cells, to see that there is no accumulation of any water. All water, if any, in completed cells will be pumped to the temporary holding lagoon.

C. Other Operating Considerations

No discharge to drainage courses from the temporary lagoon or the permanent lagoon will be made. This water will be discharged to the North Kent Sewage Disposal System. The Department of Public Works will let a contract to a local hauler on an as needed basis.

D. Finishing the Site

Two feet final cover will be placed by a scraper. Construction of the north - south interceptor cells will be done after completion of cells one thru thirty. The size of the lagoon will be determined at the time of excavation of cell No. 27. It is anticipated that upon completion of all east - west cells, there will be no material in the access manholes or sumps and that the lagoon, as listed as Alternate "A" will be quite small. We have, however, provided a contingency plan that if for some unknown reason t. . flow was beyond the capacity of a lagoon to handle, then a lift station would be

constructed and the material would be pumped to the North Kent Sewage Disposal System.

When the site is totally complete and grassed, the only continuing requirement will be:

A. Periodically take samples in the permanent dewatering wells to record any changes in level.

B. Review the status of the lagoon to see if any material is in the lagoon.

Steps A and B will be performed as a continuing maintenance program similar to other programs we continually do for sewage lift stations, sewage collecting systems and sewage lagoons presently under the control of the Department. Operation of the park facilities will be done by the Kent County Parks Department.